THE CHINHOYI UNIVERSITY Project

The Chinhoyi University of Technology, Zimbabwe and Kudiwa Waste and Energy Solutions have teamed up to prototype and then produce solar roofing tiles from plastic waste composite material. By creating a demand for plastic waste as feedstock for the roof tiles, the project plays a vital role in supporting the increased collection of plastic waste and improved revenues for existing waste collectors.

SMEP | Sustainable Manufacturing and Environmental Pollution

Technology Innovation Wealth

UKaid from the British people

The scaled manufacture of the roof tiles brings several advantages, including waste collection in underserved areas and diverting plastics from formal and informal dumpsites where open incineration is often the most widely practised means of disposal. The solar photovoltaic aspect to the roof tiles provides an affordable, sustainable clean energy solution in a region where energy supplies are critically low. The project is anticipated to contribute to Greenhouse gas reductions through avoided incineration and clean energy supply in the long term. The project has the economic advantages of promoting livelihoods for plastic waste pickers looking for local markets in an environment with limited income opportunities. The solar roof tiles will also bridge the energy access gap in Zimbabwe from the limited reliability of the electricity supply.

Selection for SMEP funding

The project was selected to receive SMEP grant funding because there are strong potential solutions to the plastic pollution challenges and local energy crisis. The solution utilises all forms of single-use plastic waste, thereby eliminating plastic waste by remanufacturing it into solar roofing tiles. The composite solar roof tiles are durable, environmentally friendly, low heat or thermal conductivity, low manufacturing cost, clean energy generation and easy to maintain. The funding from SMEP will serve for the initial capitalisation of the project, and proceeds from the sale of the solar roof tile will be ploughed back into the project and thus ensure its survival.

Operating Model

The demand for housing and roofing material is envisaged to continue a positive trajectory, ensuring the project's sustainability. The main elements of the business model are the target market and the value proposition. The target market includes households, construction companies, and government institutions. The value proposition is based on several factors such as the unique design, environmentally friendly, lightweight, durability, and low-cost product, with no need for separate solar system installation. The solar roof tiles are an integral part of the roof providing clean energy, improved building aesthetics and customisation - customers are free to choose the size of the solar system that meets their needs and budgets.

Progress to date

Please refer to live project webpages on the SMEP website for updates.

Anticipated benefits

The project contributes significantly to the waste pickers' income by increasing their average monthly income to a figure above the poverty datum line of 1USD/day. The manufactured and installed solar roof tiles will quantify the avoided emission costs of using solar PV in place of grid electricity noting Zimbabwe's electricity grid has a significant portion of up to 60% use of coal.

Solutions can include (but are not limited to) the following:

- Material substitution (e.g., the use of alternative paper-based materials or natural substances like seaweed)
- Accelerated biodegradation (e.g., the use of biodegradable materials that do not create contaminants in the manufacturing process and during and after use)
- Improved manufacturing (e.g., the modification of products to improve recyclability or enable remanufacture or the development of local manufacturing capacity from recycled materials)
- Remanufacturing (e.g., the recovery and rebuilding of used product to its original performance)
- Recycling (e.g., solutions to enable waste materials to be recycled for other uses). This may include technology solutions that connect waste providers with waste collectors and recycling companies or enable the production of construction materials (e.g., through support in prototyping, certification, piloting and commercialisation)

SMEP is funded by UKAid and is implemented in partnership with the United Nations Conference on Trade and Development (UNCTAD), providing Technical Assistance to the programme.

Project Details

Project Name	Production of eco-friendly solar roofing materials from plastic waste
Lead implementor	Chinhoyi University of Science and Technology
Consortium members and sub-contractors	Chinhoyi University of Technology and Kudiwa Waste and Energy Solutions
Project Partners	Chinhoyi University of Technology and Kudiwa Waste and Energy Solutions
Countries	Zimbabwe
Plastics Pollution mitigation category	Remanufacture
Market segment	Roofing Solar Panels, individual home builders, government departments, corporate clients
Project duration	Phase 1: January 2022 to March 2022 Phase 2: May 2022 March 2023 Phase 3: April 2023 to March 2024
Project size	GBP 447 965.66 (January 2022 - March 2024) * This sum is a tentative investment from FCDO, pending ongoing project performance and funding availability.

Contacts

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Media links

- https://twitter.com/KWESzw/status/1534590705607266306